Data Communication Theory Assignment

Read Carefully:

1. This assignment should be submitted online via **VEUS** under the component named 'SUBMISSION' on or before **27/12/2020 (Sunday) 8:00 PM**.

2. The file name must be '**Theory Assignment.pdf**' while submitting in VEUS

3. The assignment must be submitted as one pdf file. On top page of the assignment your **name, ID and section** should be mentioned clearly. You can prepare the assignment by hand or on computer.

Question (10 points):

Assume your ID is **AB-CDEFG-H**. You are given **3** (three) digital signals named **ds1**, **ds2**, and **ds3**. All three digitals signals have **2** (two) data elements in each signal element. Bit rate of these digitals signals are **(C+D+H)*100** bps, **(D+E+H)*200** bps, and **(E+F+H)*400** bps respectively. These three signals need to be transmitted together over a communication link of **10** MHz bandwidth ranging from **5** MHz to **15** MHz using **FDM**. To do that you first have to convert the digital signals using **FSK**. For FSK, use d = 1, and **(H+1)** kHz guard bands. Assume that after FSK **ds1**, **ds2**, and **ds3** are converted into **ms1**, **ms2**, and **ms3.** Now you can combine the modulated signals (**ms1**, **ms2**, and **ms3**) using FDM into one composite signal **xt** (where, **xt = ms1+ms2+ms3**) and transmit it through the given communication link. For FDM, use **(H+25)** kHz guard bands.

a) What can be appropriate central (or nominal) carrier frequencies to convert **ds1**, **ds2**, and **ds3** into **ms1**, **ms2**, and **ms3** using FSK? (**2**)
b) What can be the carrier frequencies to convert **ds3** into **ms3** using FSK? (**2**)
c) What are the bandwidths of **ms1**, **ms2**, and **ms3** after FSK? (**2**) [Take guard bands into consideration.]
d) What is the required minimum bandwidth to transmit **xt** over the given communication link using FDM? (**1**) [Take guard bands into consideration]
e) In receiver side, how can you separate **ms1**, **ms2**, and **ms3** from the received composite signal **xt** (assuming received signal is same as transmitted signal)? Explain. (**3**)